

CLAIMS

1. An atmospheric pressure combustion turbine system as a power generating system including a turbomachine having a turbine and at least one compressor, and a combustor at a stage above the turbine, and capable of generating a shaft output by passing a working fluid for driving the turbomachine through the combustor, the turbine and the compressor in that order, said atmospheric pressure combustion turbine system comprising:

- a regenerative heat exchanger capable of cooling a high-temperature working gas discharged from the turbine by making the high-temperature working gas exchange heat with a mixed gas produced by mixing an exhaust gas and air and moistened with hot water;

- at least one cooler connected to the entrance of each compressor to cool the working gas by making the working gas exchange heat with water; and

- a humidifier for producing a mixed gas by heating air by mixing part of the exhaust gas discharged from the compressor in the air and humidifying the heated air with the hot water produced by heating water by the heat of the working gas through heat exchange;

wherein the mixed gas produced by the humidifier is supplied to the regenerative heat exchanger, the regenerative heat exchanger produces a high-temperature, humid, mixed gas by making the mixed gas exchange heat with the high-temperature working gas discharged through the exit of the turbine to heat the mixed gas, and the heated, high-temperature, humid, mixed gas is supplied to the combustor.

2. An atmospheric pressure combustion turbine system as a power generating system including a turbomachine having a turbine and at least one compressor, and a combustor at a stage above the turbine, and capable of generating a shaft output by passing a working fluid for driving the turbomachine through the combustor, the turbine and the compressor in that order, said atmospheric pressure combustion turbine system comprising:

- a regenerative heat exchanger capable of cooling a

high-temperature working gas discharged from the turbine by making the high-temperature working gas exchange heat with a mixed gas produced by mixing an exhaust gas and high-temperature, humid air supplied from a high-temperature, humid air generator, heating the mixed gas and humidifying the heated mixed gas with hot water;

at least one cooler disposed at the entrance of each compressor to cool the working gas by making the working gas exchange heat with water; and

a humidifier capable of heating the high-temperature, humid air supplied from the high-temperature, humid air generator by mixing part of the exhaust gas discharged from the compressor in the high-temperature, humid air and of humidifying the heated high-temperature, humid air with the hot water produced by heating water by the heat of the working gas through heat exchange;

wherein the mixed gas produced by the humidifier is supplied to the regenerative heat exchanger, the regenerative heat exchanger produces a heated, high-temperature, humid, mixed gas by making the mixed gas exchange heat with the high-temperature working gas at the exit of the turbine to heat the mixed gas, and the heated, high-temperature, humid, mixed gas is supplied to the combustor.

3. An atmospheric pressure combustion turbine system as a power generating system including a turbomachine having a turbine and at least one compressor, and a combustor at a stage above the turbine of the turbomachine, and capable of generating a shaft output by passing a working fluid for the turbomachine through the combustor, the turbine and the compressor in that order, said atmospheric pressure combustion turbine system comprising:

a regenerative heat exchanger capable making the turbine generate power by supplying a high-temperature gas produced by an industrial heating furnace as a working fluid to the turbine and of preheating fresh air and cooling the high-temperature gas by making the high-temperature gas discharged from the turbine exchange heat with fresh air; and

at least one cooler disposed at the entrance of each com-

pressor to cool the working gas by making the working gas exchange heat with a cooling medium;

wherein the preheated air heated by the regenerative heat exchanger is supplied to the heating furnace as combustion air.

4. The atmospheric pressure combustion turbine system according to any one of claims 1 to 3, wherein the compressor is a plurality of compressors and the cooler is a plurality of coolers.